

REMARKS

Applicants appreciate the consideration shown by the Office as evidenced by the Office Action mailed on 17 June 2004. In that Office Action, the Examiner rejected claims 1-32. In this Response, Applicants have amended claim 29. Applicants respectfully request favorable reconsideration in light of the above amendments and the following remarks.

1. Claim Rejections – 35 U.S.C. §112

Claims 25 and 26 were rejected under 35 U.S.C. §112, second paragraph. The Examiner stated that claim 25 recited unclear subject matter because a step was lacking for, as the Examiner stated, "forming the core with the internal passages." The Examiner further stated that the claimed step lacked support in the specification. Applicants respectfully traverse this rejection.

The use of the words "is configured to" in claim 25 does not connote any separate step in the method, but is merely a description of the final shape of the core that is produced by the method. As such it can be seen as a further limitation on the step, recited in the base claim 19, of "manufacturing a single-piece die...said die comprising at least one internal cavity." According to claim 25, the at least one cavity of the die would be shaped to provide a core that is configured in a particular way such that when the core is used in an investment casting process, the article produced by such process will have at least one internal passage. In essence, then, claim 19 combined with claim 25 recites a method that itself is the configuring process the examiner appears to be referring to.

The recitation of claim 25 is clearly and adequately supported in the originally filed specification. Moreover, the explanation stated above is consistent with the specification. Applicants respectfully refer the Examiner to paragraph [0024], which explains in detail what is meant by "configured to form internal passages."

As the recitation in claim 25 clearly relates to the shape of the final product of the method for making a casting core, and is clearly and adequately supported by the originally filed specification, Applicants respectfully submit that claim 25 and its dependent claim 26 are compliant with the second paragraph of 35 U.S.C. §112.

2. Claim Rejections - 35 U.S.C. §102

Claims 29-32 were rejected under 35 U.S.C. §102(b) as being anticipated by Whalen et al. Applicants respectfully traverse this rejection.

Whalen et al. describes a lithographic method for forming a ceramic casting. The method involves fabricating a sacrificial die by stereolithography, introducing a ceramic slurry, then destroying the die via dissolution or decomposition, after curing the slurry, to leave behind a cast ceramic article. Whalen does not teach, suggest, or disclose the limitation of "a single piece structure comprising at least one cavity, said cavity configured to correspond to a desired configuration of at least one internal cooling circuit of a gas turbine component," as recited by amended independent claim 29 and supported in paragraph [0013] of the present application. As this reference fails to teach every element of Applicants' claim 29, it is respectfully submitted that claim 29 and its dependent claims 30-32 are patentably distinct from Whalen et al.

3. Claim Rejections - 35 U.S.C. §103

Claims 1-3, 5-20, 22-24, and 27-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Woodrum et al. in view of Whalen et al. Applicants respectfully traverse this rejection.

Woodrum et al. discloses an investment casting method for turbine components. A fugitive pattern is placed inside a multi-piece, permanent core molding die (M in Figure 4; D1 and D2 in figure 7), and a ceramic slurry is introduced into the resulting assembly to form a core. The fugitive pattern is removed by destructive means, such as heating, but the die used to make the core is not destroyed and is retained after removing the core from the die. The fugitive core, in certain cases, may be fabricated using stereolithographic methods.

Whalen et al., as noted above, describes a lithographic method for forming a ceramic casting. The method involves fabricating a sacrificial die by stereolithography, introducing a ceramic slurry, then destroying the die via dissolution or decomposition, after curing the slurry, to leave behind a cast ceramic article.

The Examiner notes that Woodrum et al. fails to teach, suggest, or disclose a method comprising providing a single-piece sacrificial die, as recited by independent claims 1, 18, and 19 of

the present application, and combines Whalen et al. in an attempt to overcome this deficiency. However, Applicants respectfully submit that the combination does not teach, suggest, or disclose the subject matter claimed by the aforementioned independent claims of the present invention.

Woodrum et al. teaches away from the use of stereolithographic processes of the type disclosed by Whalen et al. for making integral patterns used in the process of forming cores. According to Woodrum et al., the fugitive pattern elements may be made by "injection molding, stereolithographic, and other techniques." Col. 2, lines 56-59. Individual pieces of the pattern can be "made and joined together by suitable adhesive to form pattern assembly 20." Col. 2, line 66 – col. 3, line 1. Applicants note that in this description of a multi-piece method, there is no further elaboration as to what methods may be used to make the pieces, and thus, presumably, any of the "injection molding, stereolithographic, and other techniques" referenced above would be suitable for Woodrum et al.'s method. However, Woodrum et al. next goes on to describe a different method where the pattern can be all one piece. In this description, there is precise specification as to the method for forming the single piece pattern, unlike the description for the multi-piece pattern method: "Alternately, the pattern 20 can be formed as one-piece **by injection molding** of wax or other suitable pattern material in a pattern die cavity with the pattern elements P1, P2, P3 integrally connected at molded regions." Clearly, Woodrum et al. teaches that a single piece pattern is to be processed differently than a multi-piece pattern, in that here Woodrum et al. makes a special limitation as to the method to be used when making an integral pattern. Woodrum et al. was clearly aware of the uses of stereolithography, because the use of this technology was described in some detail for the multi-piece pattern method, yet the author chose to exclude this technique from applications where a single-piece pattern is to be used. One skilled in the art would conclude from Woodrum et al. that stereolithography, of the type described in Whalen et al., is not an appropriate technology for use in integral pattern applications. Supporting this observation is the fact that Whalen et al. was issued more than 2 years prior to Woodrum et al., and yet Woodrum et al. still chose to limit the use of lithographic techniques to multi-piece pattern methods.

In summary, one skilled in the art would not combine the stereolithographic technique of Whalen et al. with the investment casting technique of Woodrum et al. because Woodrum et al. teaches away from the use of stereolithographic techniques where integral, one-piece patterns are to be used to fabricate complex ceramic cores. Therefore, Applicants respectfully submit that claims 1,

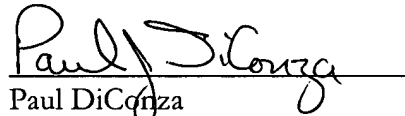
18, and 19, and their respective dependent claims rejected herein, are patentably distinct from the applied combination of references.

The Examiner further presented two other combinations of references to reject claims 4 and 21, and claims 25 and 26, respectively. Claim 4 depends from claim 1, and claims 21, 25, and 26 depend from claim 19. These base claims are believed to be allowable for the reasons set forth above, and thus Applicants respectfully submit that claims 4, 21, 25, and 26 are allowable due to their dependencies from allowable base claims.

4. Conclusion

In light of the remarks presented herein, Applicants believe that this serves as a complete response to the subject Office Action. If, however, any issues remain unresolved, the Examiner is invited to telephone the undersigned at the number provided below.

Respectfully submitted,



Paul DiConza
Reg. No. 48,418
General Electric Company
Building K1, Room 3A60
Telephone: (518) 387-6131

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